

Crypto Update 2013

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What is it?

The 4 C's of 2013

Cyclospora

Coliform

Crypto

Confusion!

Video Intro

RWI Police

RWI Police

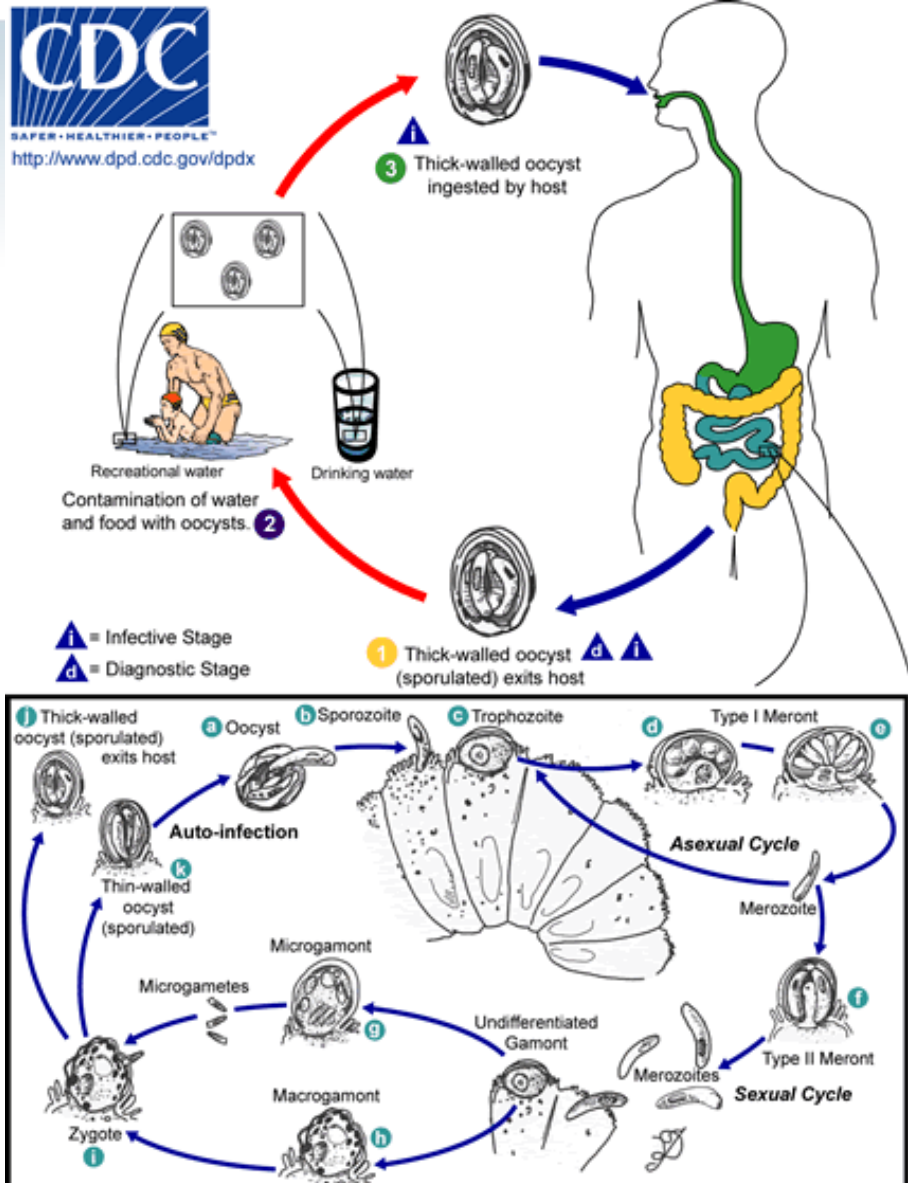
<http://www.youtube.com/watch?v=KTBow5l8dg>

Cryptosporidium

Cryptosporidium is a microscopic parasite that causes the diarrheal disease cryptosporidiosis. There are many species of Cryptosporidium that infect humans and animals. Both the parasite and the disease are commonly known as "Crypto."

- The parasite is protected by an outer shell that allows it to survive outside the body for long periods of time and makes it very tolerant to chlorine disinfection.
- *Cryptosporidium parvum* and *Cryptosporidium hominis* are the most prevalent species causing disease in humans.
- Transmission of *Cryptosporidium parvum* and *C. hominis* occurs mainly through contact with oocysts that become ingested. Following ingestion by a suitable host the parasites undergo asexual multiplication and then sexual multiplication to develop oocysts that sporulate in the infected host. Oocysts are infective upon excretion, thus permitting direct and immediate fecal-oral transmission.

Cryptosporidium Life Cycle



Who's at Risk?

- Anyone can get cryptosporidiosis.
- High-risk persons include:
 - Child care workers and diaper-aged children who attend child care centers;
 - Parents & family of infected children;
 - International travelers;
 - Swimmers who swallow water while swimming in swimming pools, lakes, rivers, ponds, and streams;
 - Animal workers – particularly cattle
 - Persons who consume raw milk, other unpasteurized dairy products, or unpasteurized juices

Major Potential Routes of Transmission

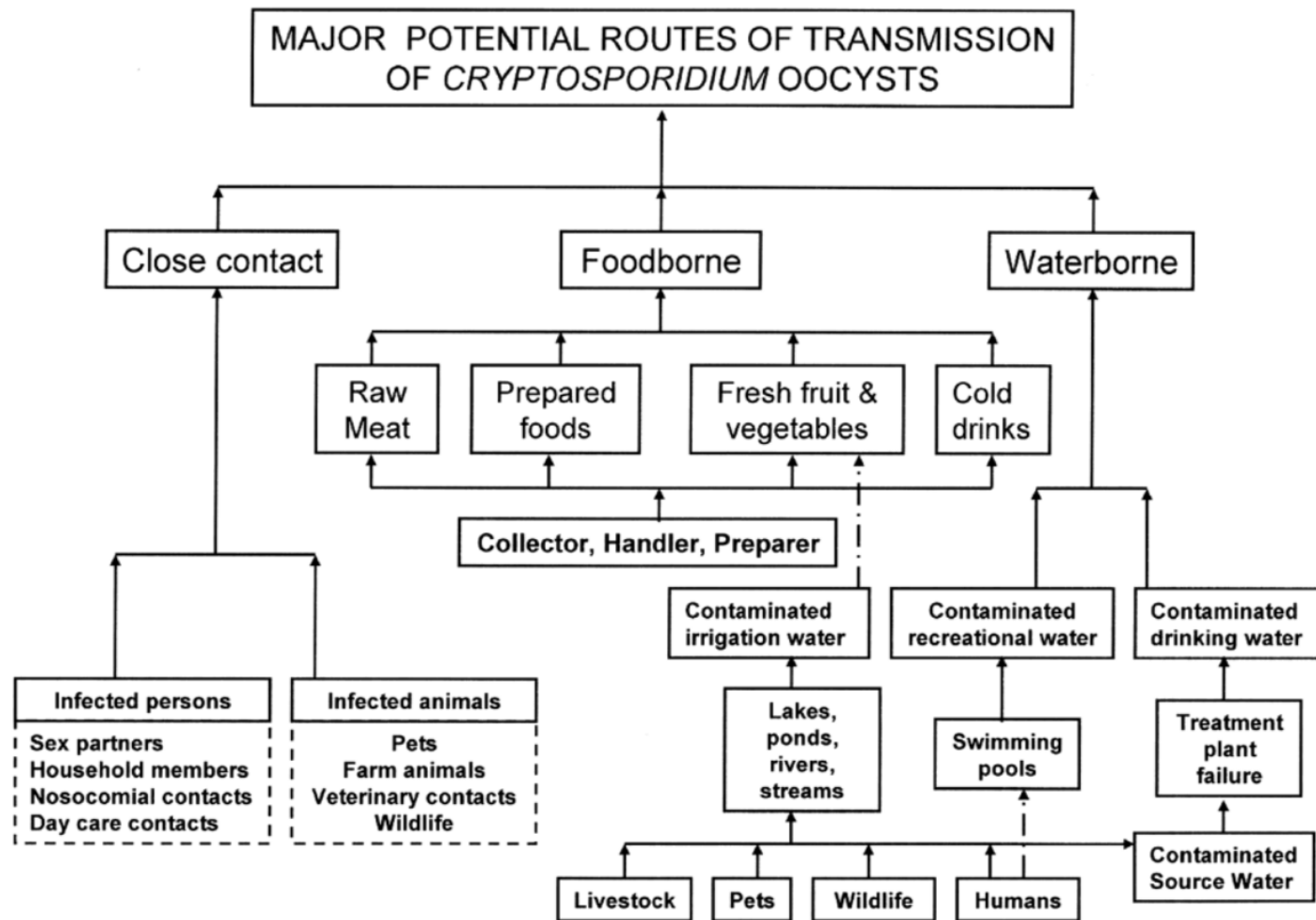


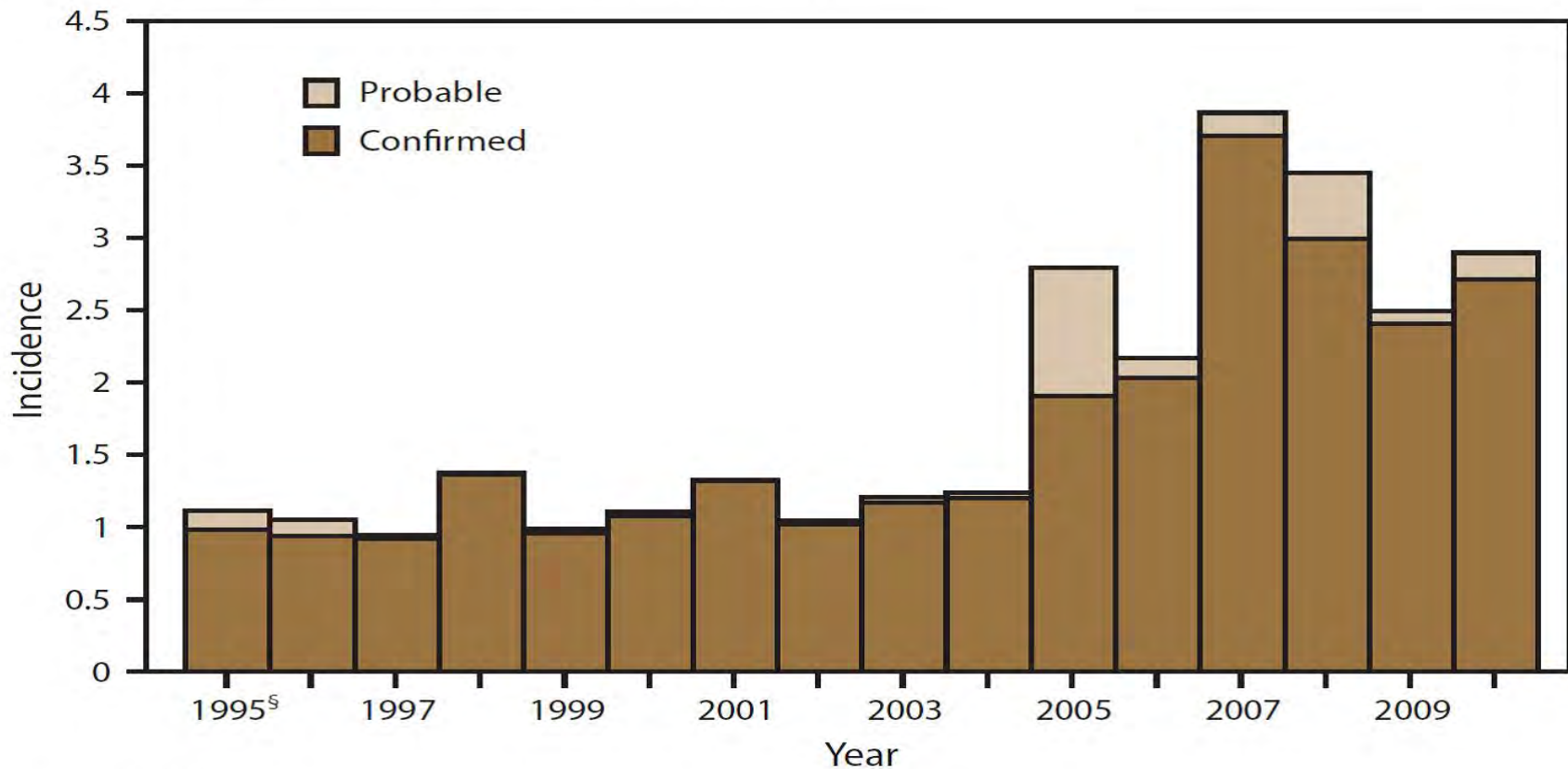
FIGURE 1.1 A “Fault Tree” depicting sources of oocysts and routes of transmission. (Courtesy of Nancy Fayer.) (From Fayer, R., 1997. *Cryptosporidium and Cryptosporidiosis*. CRC Press, Boca Raton, FL. With permission.)

Cryptosporidiosis

- Incubation period: 1 to 12 days
- Primary symptoms
 - Diarrhea, which may be profuse and watery
 - Abdominal pains/cramps
 - Lack or loss of appetite for food
- Symptoms generally resolve in 30 days or less in healthy people
- May become serious in immunocompromised people

It's Not Going Away.....

FIGURE 1. Incidence* of cryptosporidiosis, by year — National Notifiable Diseases Surveillance System, United States, 1995–2010[†]



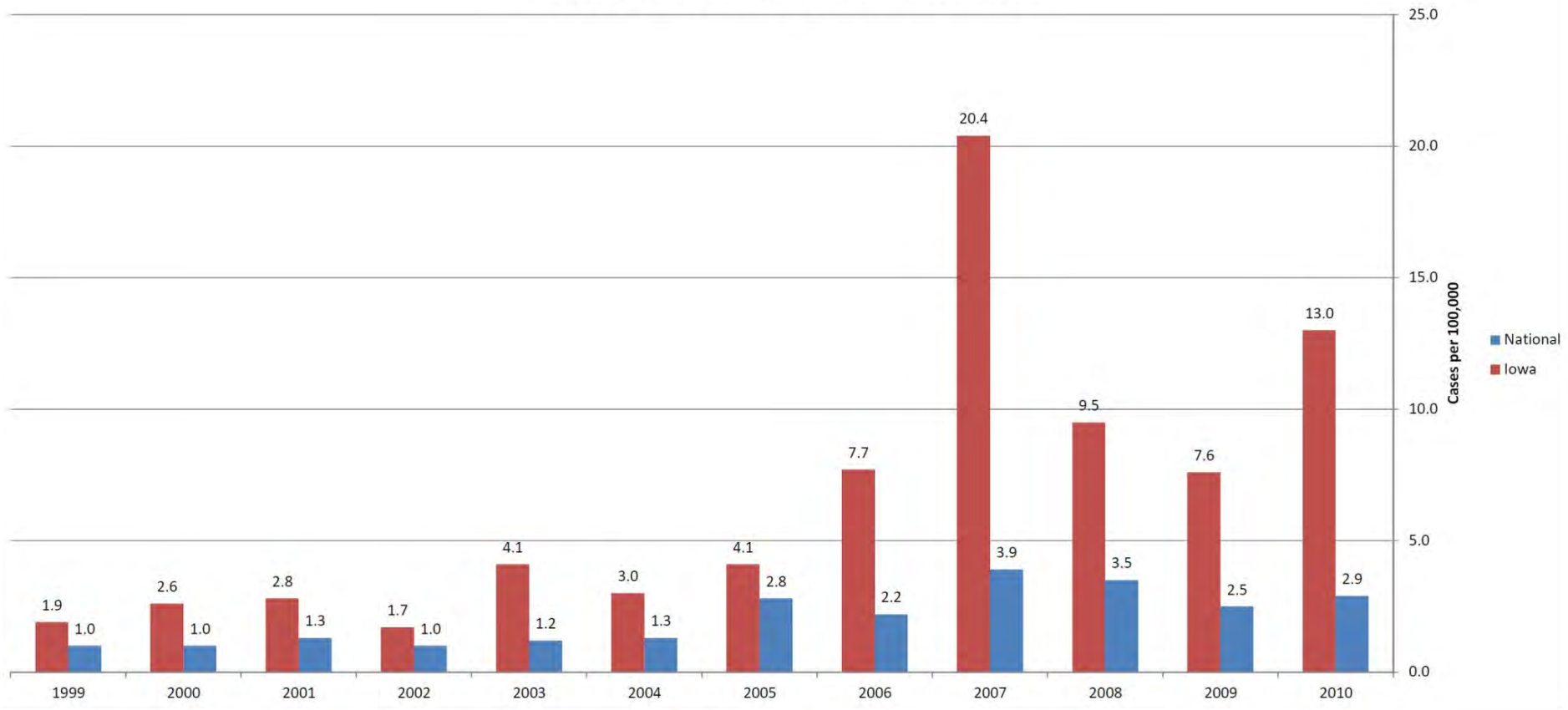
* Per 100,000 population.

[†] N = 85,514.

[§] First full year of national reporting.

And Iowa Rates Higher than National Rates

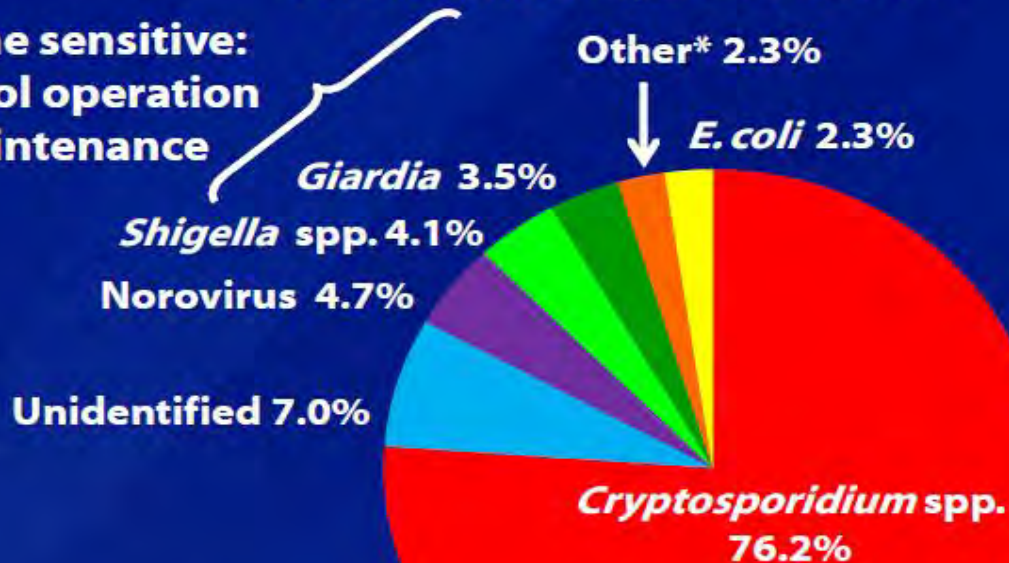
CDC Cryptosporidium Surveillance Rates



What's this got to do with pools?

Outbreaks of Acute Gastrointestinal Illness Associated with Treated Recreational Water Use, United States, 2001–2010

Chlorine sensitive:
Poor pool operation
& maintenance



*Other includes
Campylobacter, *Salmonella*,
Plesiomonas, and
multiple pathogens

Extremely
chlorine
tolerant

N=172; Hlavsa MC *et al.* 2011. MMWR 60(SS-12):1–39; preliminary 2009–2010 data updated 12 September, 2013.

Inactivation Time Chlorinated Water

Microbe	Time
<i>E. coli</i> O157:H7	<1min
Hepatitis A virus	~16 min
<i>Giardia</i> parasite	~45 min
<i>Cryptosporidium</i> parasite	~15,300 min (10.6 days)

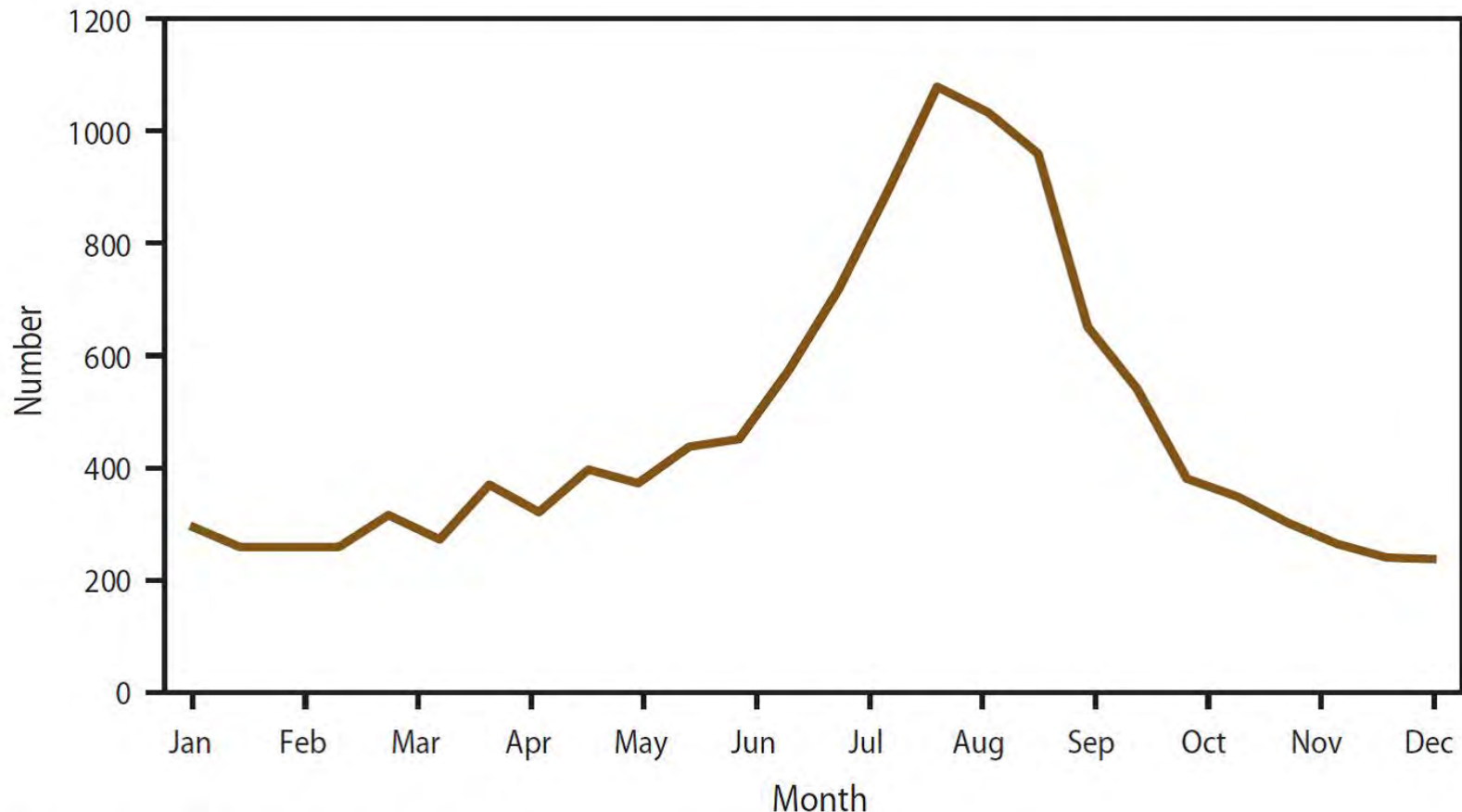
*1 ppm (1 mg/L) chlorine at pH 7.5 and 77 degrees

Fecal Accident Response Recommendations:

www.cdc.gov/healthyswimming/fecal_response.htm

Crypto occurs all year but peaks in summer

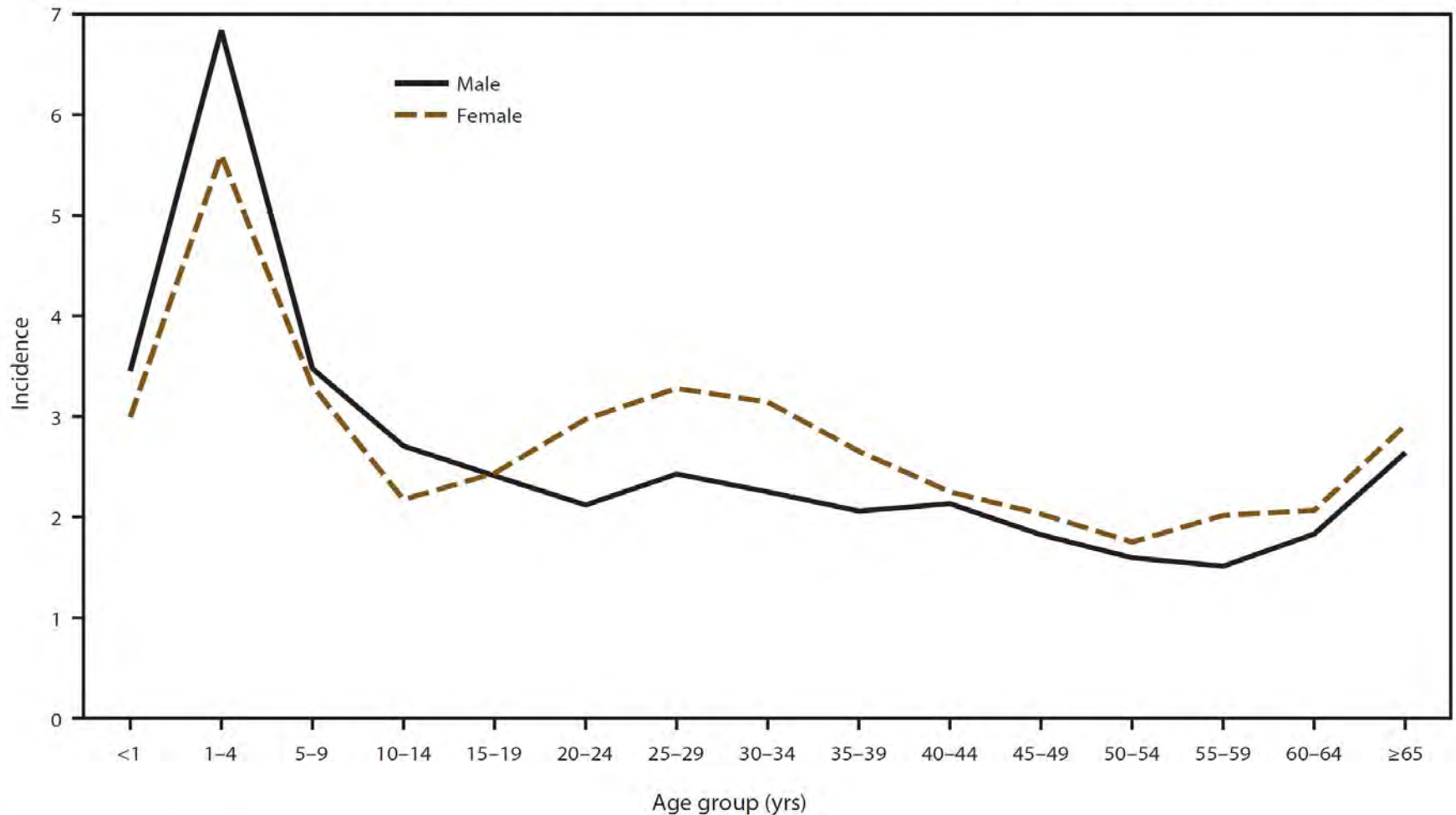
FIGURE 3. Number* of cryptosporidiosis case reports, by date of symptom onset — National Notifiable Diseases Surveillance System, United States, 2009–2010



* N = 16,607; date of onset for 4,381 patients was unknown.

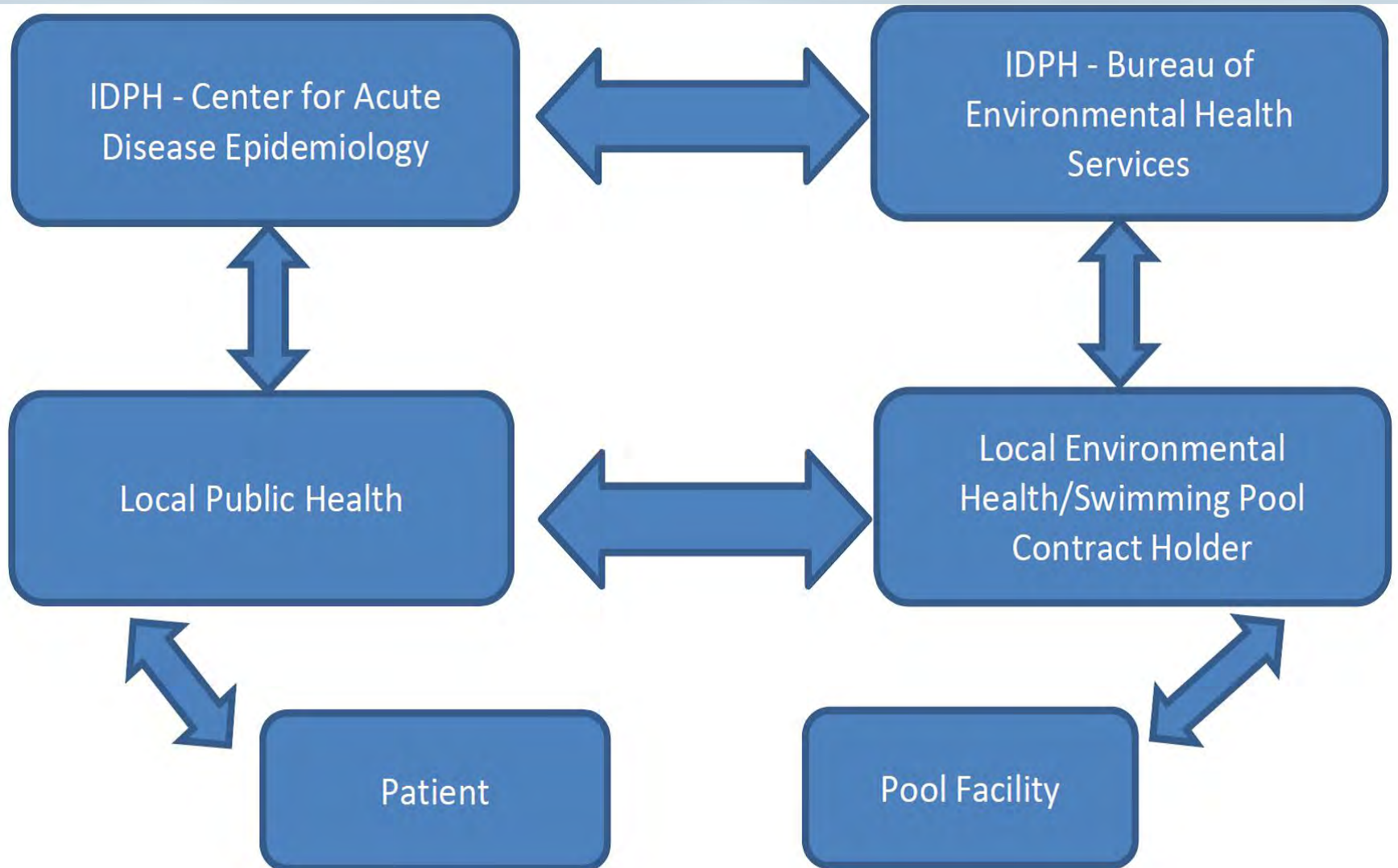
Crypto has a high incidence among children

FIGURE 5. Incidence* of cryptosporidiosis, by sex and age group — National Notifiable Diseases Surveillance System, United States, 2009–2010



* Per 100,000 population.

Confirmed Case, Now what?



CADE EPI Manual

C. Local Public Health Agency Follow-up Responsibilities

Case Investigation

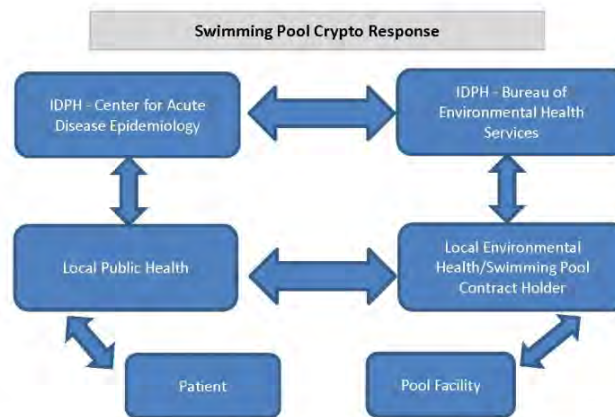
- a. It is the LPHA's responsibility to complete a Cryptosporidiosis Case Investigation Form by interviewing the case and others who may be able to provide pertinent information. Much of the information on the form can be obtained from the case's health care provider or the medical record.
- b. Use the following guidelines in completing the form:
 1. Accurately record the demographic information, event information, laboratory findings, date of symptom onset, symptoms, treatment, and other clinical information.
 2. When asking about exposure history (food, travel, activities, etc.), use the incubation-period for cryptosporidiosis (1-12 days).
 3. Ask questions about travel history and group gatherings to help identify where the case became infected.
 4. If possible, record any restaurants at which the case ate, including food items(s) and date consumed.
 - 5. Ask questions about water exposures. If exposure is thought to be related to a swimming pool, wading pool, spray/splash pad, or spa exposure, the responsible environmental health agency should be notified (refer to the Pool Inspection Contractor Contact List) so that an exposure risk assessment can be conducted and action can be taken to prevent further exposure at that site.**
 6. Ask questions about water supply because cryptosporidiosis may be acquired through water consumption. 7. Household/close contact, pet or other animal contact, child care, and food handler questions are designed to examine the case's risk of having acquired the illness from, or potential for transmitting it to, these contacts. Determine whether the case attends or works at a child care and/or is a food handler or has recently shown calves at a county fair.
 8. Ask if the patient knows others who have similar illness about the same time.
 9. If several attempts have been made to obtain case information, but have been unsuccessful (e.g., the case or health care provider does not return calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as has been gathered. Please note on the form the reason why it could not be filled out completely. If using IDSS, select the appropriate reason under the Event tab in the Event Exception field.

Why does it take so long to get crypto notifications?

- **Time Frames**

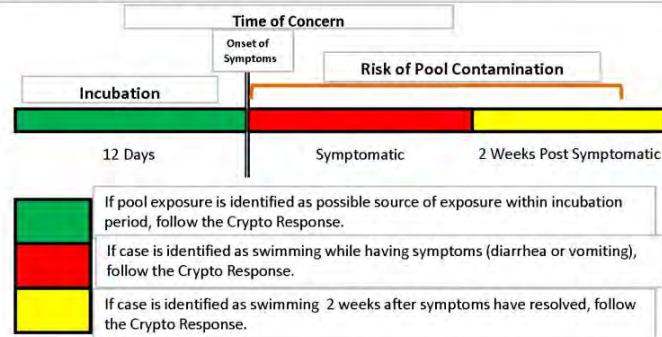
- Incubation 1-12 days, Average 7 days
- 2-3 days before seeing a doctor
- A week for lab confirmation
- Time for report to reach CADE or PHN
- Time to get exposure information

Pool Crypto Response

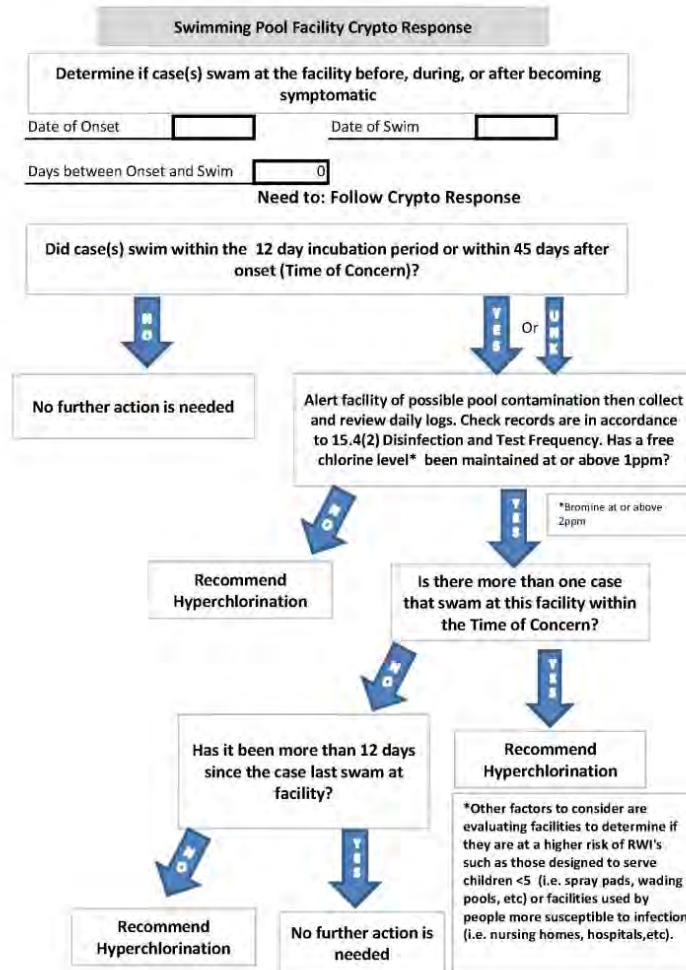


SWIMMING POOL CRYPTO RESPONSE:

1. All confirmed cases of *Cryptosporidium* are required to be reported to the Iowa Department of Public Health, Center for Acute Disease Epidemiology (CADE) through the Iowa Disease Surveillance System (IDSS).
2. CADE will communicate positive results with the Local Public Health agency, who will perform a patient interview.
3. If patient swam at a registered pool facility during the incubation or risk of pool contamination period, the Bureau of Environmental Health Services and the contracted inspection agency will be notified.
4. The contracted inspection agency will determine appropriate response and maintain documentation of response in facility file.



Pool Crypto Response (cont.)



Hyperchlorination

Hyperchlorination to Kill *Cryptosporidium**

Recommendations for Aquatics Operators of Treated Venues

Cryptosporidium (or "Crypto") is an extremely chlorine-tolerant parasite, so even well-maintained pools and interactive fountains can spread Crypto among swimmers. If an outbreak of Crypto infections occurs in your community, the health department might ask you to hyperchlorinate. Additionally, to help keep Crypto levels low, you might choose to hyperchlorinate periodically (for example, weekly). If necessary, consult an aquatics professional to determine or identify the feasibility, practical methods, and safety considerations before attempting to hyperchlorinate at your facility.

Step 1: Close the pool to swimmers. If you have multiple pools that use the same filtration system — all of the pools will have to be closed to swimmers and hyperchlorinated. Do not allow anyone to enter the pool(s) until hyperchlorination is completed.

Step 2: Raise the water's free chlorine concentration (see Table) and maintain pH 7.5 or less and the temperature at 77°F (25°C) or higher.

Step 3: Achieve a concentration time inactivation value (Ct) of 15,300[†] to kill Crypto. The Ct refers to the concentration of free chlorine in parts per million (ppm) multiplied by time in minutes at a specific pH and temperature (see footnote [§] for guidance if chlorine stabilizer is used).

Use the formula below to calculate the time required for Crypto inactivation

Concentration time inactivation value (Ct)	+	Free chlorine concentration (C) (parts per million)	Time (t) (minutes)
15,300 ^{†,§}	+	20 [¶]	= 765
15,300	+	10	= 1,530

Step 4: Confirm that the filtration system is operating while the water reaches and is maintained at the proper free chlorine level for disinfection.

Step 5: Backwash the filter thoroughly after reaching the Ct. Be sure the effluent is discharged directly to waste and in accordance with state or local regulations. Do not return the backwash through the filter. Where appropriate, replace the filter media.

Step 6:** Allow swimmers back into the water only after the required Ct has been achieved and the free chlorine and pH levels have been returned to the normal operating range allowed by the state or local regulatory authority.

* Check for existing guidelines from your local or state regulatory agency before use. CDC recommendations do not replace existing state or local regulations or guidelines.

[†] Shields JM, Hill VR, Arrowood MJ, Beach MJ. Inactivation of *Cryptosporidium parvum* under chlorinated recreational water conditions. J Water Health. 2008;6(4):523–20.

[§] Crypto Ct is based on killing 99.9% of Crypto. This level of Crypto inactivation cannot be reached in the presence of 50 ppm chlorine stabilizer, even after 24 hours at 40 ppm free chlorine, pH 6.5, and a temperature of 77°F (25°C). Extrapolation of these data suggest it would take approximately 30 hours to kill 99.9% of Crypto in the presence of 50 ppm or less cyanuric acid, 40 ppm free chlorine, pH 6.5, and a temperature of 77°F (25°C) or higher. Shields JM, Arrowood MJ, Hill VR, Beach MJ. The effect of cyanuric acid on the chlorine inactivation of *Cryptosporidium parvum* in 20 ppm free chlorine. J Water Health. 2006;7(1):109–14.

[¶] Many conventional test kits cannot measure free chlorine levels this high. Use chlorine test strips that can measure free chlorine in a range that includes 20–40 ppm (such as those used in the food industry) or make dilutions for use in a standard DPD test kit using chlorine-free water.

** CDC does not recommend testing the water for Crypto after hyperchlorination is completed. Although hyperchlorination destroys Crypto's infectivity, it does not necessarily destroy the structure of the parasite.



Department of Health and Human Services
Centers for Disease Control and Prevention

Remediation Log

The facility should log the steps taken to remediate any crypto that may be present.

The log should include the person responsible, date and time remediation began, water temperature, and cyanuric acid concentration.

- At regular intervals the time, free chlorine, and pH level should be logged to demonstrate total CT was achieved.
- After required CT has been achieved, the water chemistry must be returned to appropriate levels and logged before reopening the facility.

Other Crypto Countermeasures

Properly designed secondary disinfection systems such as UV and Ozone can be effective countermeasures against cryptosporidium.

- The Swimming Pool Rules provide no requirements regarding secondary disinfectants or their design criteria, and there is no current requirements regarding the maintenance and logging of the specific output levels of these systems the department cannot readily determine the effectiveness of a particular facility's secondary disinfection systems where installed.
- A facility could consult with their engineer and pool equipment suppliers to determine as part of their risk assessment if their systems could supplement or eliminate the need to hyperchlorinate to inactivate cryptosporidium and what output levels should be maintained and with what frequency they should be logged.

Why facilities may want to consult with a professional company

To determine the most optimal and practical methods and needed safety considerations.

- Some facilities lack knowledgeable staff to perform hyperchlorination (i.e. Draining and refilling without hyperchlorinating).
- Most outdoor facilities use cyanuric acid and may operate outside of the pH or temperatures limits in the CDC hyperchlorination guidance requiring CT adjustments.
- Hyperchlorination requires chlorine levels that may exceed the typical range of standard test kits.
- Manual feeding of large quantities of chemicals may require additional personal protective equipment or safety considerations.

Why not test?

If a pool is implicated with crypto (2 or more cases) our first priority is to prevent further spread of disease

- Pools should hyperchlorinated as soon as reasonably possible
- Complicated testing- need a minimum of 10 liters of water for sample and requires many days to complete
- Cannot differentiate between live and dead oocysts
- Test recovery in even the best laboratories is 50%
- Does not add value- testing is expensive with no added benefit

When testing may be appropriate

- During a large outbreak in a concentrated area the department (CADE and EHS) in conjunction with the State Hygienic Laboratory and CDC may request a water sample be collected prior to hyperchlorination/remediation.
- Remediation would begin immediately after samples collected prior to laboratory results to prevent further spread of illness.

Reducing the Risk of Crypto Transmission

Educate, advise, empower!

- Educate the facilities on proactive steps
- Educate the public on good hygiene practices

Educate the Facilities

- Filtration
- Ozone
- UV
- Coagulants
- Increase turn-over rates
- Planning for Hyperchlorination
- Minimizing cyanuric acid
- Elevating disinfection levels
- Diaper changing stations made available
- Proper fecal contamination response
- Require swim diapers
- Clear pool for regular restroom breaks
- Signage

Video Intro

Olga

Olga

<http://www.youtube.com/watch?v=H11I1K2VWVw>

Educate the Public/Patron

- Shower before swimming
- No pool water in the mouth
- Do not go to pools when ill
- Do not return to pool for two weeks after symptoms subside
- Diaper aged children have swim diapers
- Do not change diapers poolside
- Take children for regular bathroom breaks

Video Intro

Keep it Clean

Video

<http://www.youtube.com/watch?v=YN3AchQXMUA>

Facility Messaging

Healthy Swimming

Six "PLEAs" for Protection Against
Recreational Water Illnesses (RWIs)

- PLEASE** do not swim when you have diarrhea. This is especially important for kids in diapers.
- PLEASE** do not swallow the pool water.
- PLEASE** practice good hygiene. Take a shower before swimming and wash your hands after using the toilet or changing diapers.
- PLEASE** take your kids on bathroom breaks or check diapers often.
- PLEASE** change diapers in a bathroom and not at poolside.
- PLEASE** wash your child (especially the rear end) thoroughly with soap and water before swimming.



For more information go to: www.healthyswimming.org

And today's top news story is.....

- Work with PIO to establish talking points and preparing message
- Educate the public on their responsibility to avoid contaminating facilities
- The goal should be to instill public confidence that preventive measures and safety standards are in place to reduce spread of illness through the facilities

RWI Ongoing Media Messaging

- Work with your PIO to develop a plan for communicating to the media about RWI's
- Develop informational package with fact sheets, links to CDC, and other relevant websites
- Press releases before and throughout the peak season including CDC Recreational Water Illness and Injury Prevention Week (May 19-25, 2014)

Contact Information

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